CHAPTER 1

PURPOSE AND NEED

1.0 INTRODUCTION

Kennedy Oil (Kennedy) of Gillette, Wyoming, has notified the Bureau of Land Management (BLM), Rock Springs Field Office (RSFO), that the company proposes an exploratory pilot project (Proposed Action) to explore for, test, and potentially develop coal bed methane (CBM) wells. The two 10-well groupings (pods) comprising the Proposed Action are within the Red Desert Watershed Management Area of the Great Divide Basin located in south central Wyoming (Figure 1.1). The BLM refers to this project as the Lower Bush Creek Exploratory Coal Bed Methane Project (Project). The Project is within the administrative boundary of the RSFO in Townships 24 and 25 North, Range 98 West, 6th Principal Meridian, Sweetwater County, Wyoming. The proposed well sites are located on public lands administered by the BLM. The proposed wells would develop federal fluid minerals. The analysis area, here defined as the sections directly affected by the Proposed Action, encompasses approximately 3,500 acres.

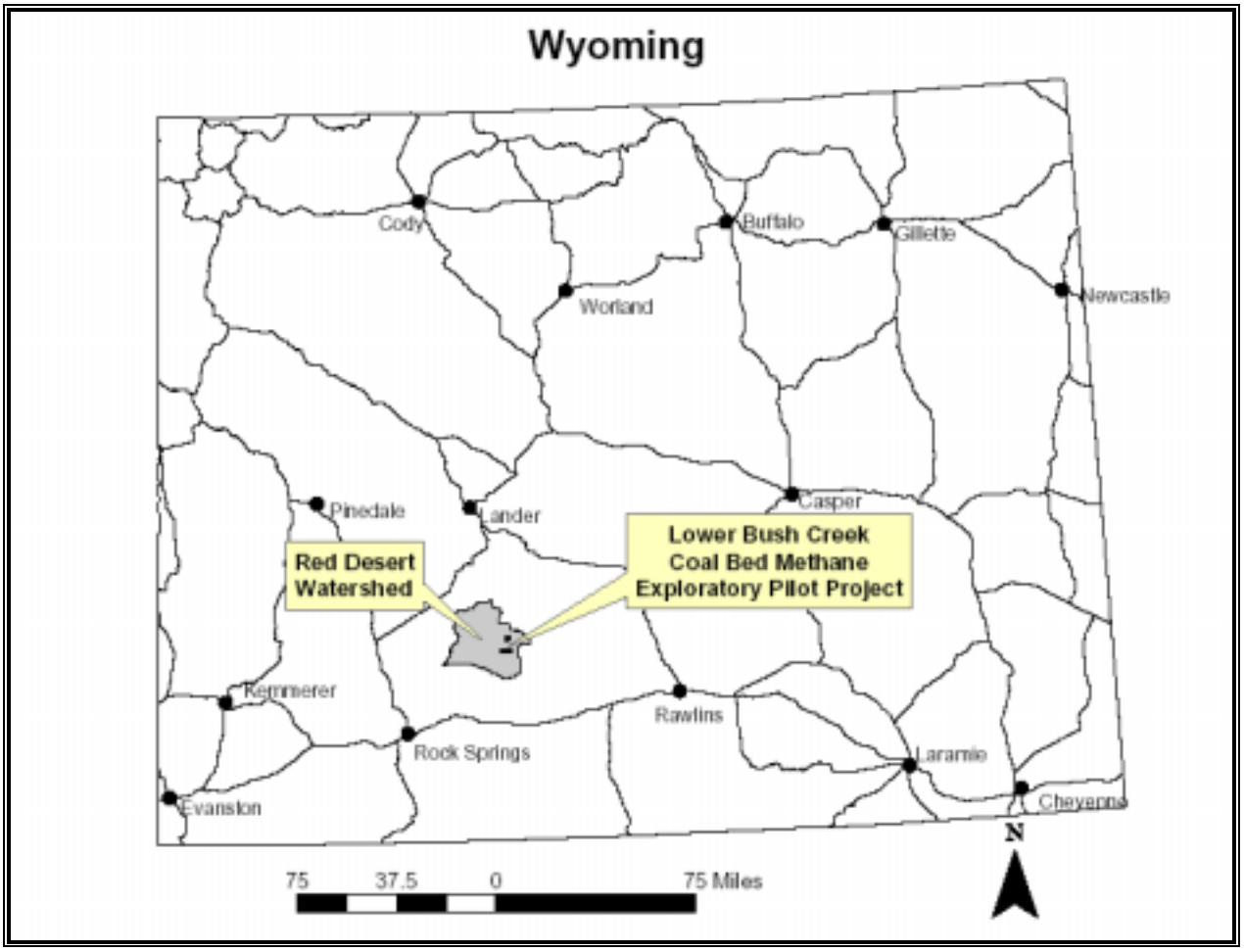
The Proposed Action involves drilling and testing commercial CBM production potential of the Big Red Coal seam in the Fort Union Formation with two pods of 10 exploratory CBM wells on 160-acre spacing. This well number and spacing is believed to be the minimum necessary to sufficiently de-water the coal, allow the gas to desorb through reduced pressure in the coal seam, and determine whether natural gas production is economically viable in the coal at this location. All produced water will be reinjected into a sandstone formation containing water of lesser or equal quality as compared with the injected water. This Proposed Action would require the construction of access roads, completion of two injection wells and related production facilities for each of the pods, known as the North Sweetwater Pilot and the Central Sweetwater Pilot.

Access to the area is by Interstate Highway 80 and Sweetwater County Road 4-21 (Bar X Road). Driving directions are as follows: Travel approximately 42 miles east from Rock Springs, Wyoming or approximately 60 miles west from Rawlins, Wyoming, on I-80 to Exit 152 access to Sweetwater County Road 4-21 (Bar X Road), then travel north on the Bar X Road for approximately 33 miles to the project area. Figure 1.1 provides a general location map and a more specific map of the pods and related access roads/pipeline facilities can be found in Chapter 2 (Figure 2.1).

1.1 PURPOSE AND NEED FOR THE PROPOSAL

Exploration and development of federal oil and gas leases by private industry is an integral part of the BLM's oil and gas leasing program under the authority of the Mineral Leasing Act of 1920 as amended. The Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management

Figure 1.1, General Location Map



Act of 1976, the National Materials and Minerals Policy, Research, and Development Act of 1980, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

Exploration and production of natural gas, including methane gas from coal-bearing formations, is in accordance with the President's National Energy Policy, Executive Order 13212. The policy calls for federal agencies "to develop a national energy policy designed to help the private sector, and, as necessary and appropriate, State and local governments, promote dependable, affordable, and environmentally sound production and distribution of energy for the future." Natural gas is an integral part of the U.S. energy future due to its availability, the presence of an existing market delivery infrastructure, and the environmental advantages of clean-burning natural gas.

The purpose and need for this project is to drill to and test for methane gas within a coal bearing formation. The Proposed Action would allow for exploration to determine the commercial production potential of federal oil and gas leases issued by the BLM. The proposed CBM development would exercise the leaseholders' existing rights to drill for, extract, remove, and market gas products if exploration proves successful. National mineral leasing policies and the regulations

by which they are enforced recognize the statutory right of lease holders to develop federal mineral resources to meet continuing needs and economic demands so long as undue and unnecessary environmental degradation is not incurred. Also included is the right of the lease holder within the project area to build and maintain necessary improvements, subject to renewal or extension of the leases in accordance with the appropriate authority. The proposal would allow Kennedy to determine through exploration of CBM if larger scale development is feasible.

1.1.1 PURPOSE OF THE ENVIRONMENTAL ANALYSIS PROCESS

The purpose of this environmental assessment (EA) is to provide the decision-makers with information needed to make a decision that is fully informed and based on factors relevant to the proposal. It also documents the analysis conducted on the proposal and alternatives in order to identify environmental impacts and mitigation measures necessary to address those impacts.

Factors considered during the environmental analysis process for this proposal include:

- Determine whether the proposal and alternatives are in conformance with BLM policies, regulations, and approved resource management plan direction.
- Determine whether the proposal and alternatives are in conformance with the policies and regulations of other agencies likely associated with this project.
- Determine whether location of environmentally suitable well pad locations access roads, pipelines, and production facilities best meet other resource activities and minimize resource impacts, yet honor the lease rights within the project area.
- Determine whether impacts on the human environment resulting from the Proposed Action and the alternatives are significant and develop mitigation measures necessary to avoid or minimize impacts.

Although the BLM has the authority to deny individual APDs and ROW applications, the lessees' right to drill and develop cannot be denied entirely. Pursuant to the *Federal Land Policy and Management Act of 1976* (FLPMA), the BLM also has the authority and responsibility to protect the environment within federal oil and gas leases; therefore, restrictions may be imposed on lease terms. However, mitigation measures that would render a proposed operation uneconomic or unfeasible are not consistent with the lessee's rights and cannot be required unless they are included as a lease stipulation or are necessary to prevent unnecessary and undue degradation of public lands or resources (43 CFR 3101.1-2). This EA will provide a resource-specific analysis of the impacts associated with the Proposed Action and alternatives to determine whether any significant impacts would likely occur that would require the preparation of an EIS.

1.2 CONFORMANCE AND AUTHORIZATION ACTIONS

Land use plan decisions within this area are contained in the Green River Resource Management Plan (GRRMP). The Record of Decision for the GRRMP was signed in 1997. The environmental analysis that supports the decisions made in the GRRMP is documented in Green River Resource Area Resource Management Plan Draft and Final Environmental Impact Statement (1992, 1996).

Values applicable to the proposal and to the GRRMP are described in Chapter 3, the Affected Environment. The other land use plan decisions applicable to the area are described in the GRRMP.

The objective for management of the minerals program in the RSFO area is to maintain or enhance opportunities for mineral exploration and development, while protecting other values. Management of oil and gas resources provides for leasing, exploration and development of oil and gas, including that which originates in coal-bearing seams, while protecting other resource values. All public lands in the analysis area have been considered and found suitable for oil and gas leasing and development, subject to certain stipulations and appropriate mitigation measures (GRRMP 1997). In accordance with 43 CFR1610.5, the Proposed Action has been reviewed and has been found to be in conformance with the GRRMP.

The project area is located in the Red Desert Watershed Management Area. The objective for managing the Red Desert Watershed Area is to manage for all resource values with emphasis on protection of visual resources, watershed values, and wildlife resources and to provide large areas of unobstructed views for enjoyment of scenic qualities. This is accomplished through facility design and placement and using topography to shield activities, using neutral colors so facilities blend with the landscape, identification of backcountry byways, and providing viewing points for the public (GRRMP 1997).

Management actions for the Red Desert Watershed Management Area allow for surface disturbing activities, mineral exploration and development subject to the guidelines found under the GRRMP, Minerals section. Management objectives and actions for mineral development are to allow for mineral exploration and development. Leases contain stipulations to protect certain resource values.

One lease, WYW153613, has a controlled surface use stipulation, which requires an "acceptable plan" in order to mitigate anticipated impacts to watershed, visual, wildlife, and soils. The criteria for an acceptable plan can be found in Appendix A.

A tiered approach to environmental review is used by the BLM in actions involving the leasing, exploration, and development of mineral resources. Initial environmental review occurs during BLM land use planning, during which the appropriateness of leasing and stipulations for development are identified with public input. Accordingly, the federal minerals within the RSFO area that have been leased to Kennedy carry a contractual commitment to allow for the mineral development in accordance with the terms and conditions of the respective leases. During exploration, site-specific Environmental Assessments (EAs) are prepared to ensure that unnecessary and undue impacts to surface and subsurface resource values do not occur. This EA serves as site-specific analysis for the two pods; however, further analysis may be required if there is a change in circumstances. This EA tiers to and incorporates the GRRMP and Draft (1992) and Final EIS (1996) and Record of Decision (1997).

In addition to addressing project-specific impacts, this EA will serve to update the assumptions for analysis for the Final Environmental Impact Statement (1996) for the Green River Resource Management Plan. The analysis contained in this EA provides an evaluation of impacts associated with an increased level of cumulative development in the Red Desert Watershed Area (RDWA). Specifically, the analysis in this EA provides a disclosure of the impacts of 20 exploratory wells and

related facilities within the RDWA. At the time the Final EIS for the Green River RMP (1996) was being prepared, it was assumed that 10 new producing wells would be drilled in the RDWA. The analysis in this EA updates this assumption to 20 new producing wells. The impacts of the proposed level of development do not result in a change to the existing RMP decisions or the addition of a new decision to the GRRMP. The Proposed Action is within the intent, scope, and meaning of the GRRMP.

The Proposed Action is in conformance with the *State of Wyoming Land Use Plan* (Wyoming State Land Use Commission 1979) and the Sweetwater County Land Use Plan (Sweetwater County Board of Commissioners [SCBC] 1996) and complies with all other relevant federal, state, and local laws. Table 1.1 provides an overview of laws applicable to oil and gas development and an overview of the key regulatory requirements that would govern oil and gas project implementation. Additional approvals, permits, and authorizing actions may be necessary.

Table 1.1
Major Federal, State, and Local Permits, Approvals, and Authorizing Actions Applicable to Oil and Gas Development in Sweetwater County, Wyoming

Agency	Permit, Approval, or Action	Authority
U.S. Fish and Wildlife Service (USFWS)	Coordination, consultation and impact review federally listed threatened and endangered (T&E) species	Fish and Wildlife Coordination Act (16 U.S.C. 661-666c); Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1536); bald eagle Protection Act (16 U.S.C. 668-668dd)
	Migratory bird impact coordination	Migratory Bird Treaty Act (16 U.S.C. 704)
U.S. Environmental Protection Agency (EPA)	Spill Prevention Control and Countermeasures (SPCC) Plans	Oil Pollution Prevention, as amended (40 C.F.R. 112)
	Regulate hazardous waste treatment, storage, and/or disposal	Resource Conservation and Recover Act of 1976, as amended (42 U.S.C. 6901 et req.)
U.S. Department of Energy (DOE)	Regulate interstate pipeline product transportation	Various sections of the U.S.C.
	Rights-of-way (ROW) grants and temporary use permits for pipelines and central tank battery on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 185); Onshore Oil and Gas Unit Agreements: Unproven Areas, as amended (43 C.F.R. 3180)
	ROW grants for access roads on BLM-managed land	Federal Land Policy and Management Act (43 U.S.C. 1761-1771); Right-of-Way, Principles and Procedures, as amended (43 C.F.R. 2800)
	Authorization for flaring and venting of natural gas on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Plugging and abandonment of a well on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Antiquities and cultural resource permits on BLM-managed land	Antiquities Act of 1906, as amended (16 U.S.C. 431-433); Archaeological Resources Protection Act of 1979, as amended (16 U.S.C. 470aa-47011); Preservation of American Antiquities, as amended (43 C.F.R. 3)
	Approval to dispose of produced water on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Special

Agency	Permit, Approval, or Action	Authority
		Provisions, as amended (43 C.F.R. 3164); Onshore Oil and Gas Order No. 7 as amended (58 Federal Register 47,354)
Sweetwater	Mineral extraction permits	County Code
County	Construction/use permits	County Code and Zoning Resolution
	Conditional use permits	County Code and Zoning Resolution
	Road use agreements/oversize trip permits	County Code
	County road crossing/access permits	County Code / Engineering Department
	H_2S contingency plan	County Health Department
	Small wastewater permits	County Health Department
	Hazardous material recordation and storage	County Code
	Zone changes	Zoning Resolution
	Filing fees	County Code
	Noxious weed control	County Code
U.S. Department of Transportation (DOT)	Control pipeline maintenance and operation	Transportation of Natural and Other Gas by Pipeline; Annual Reports, Incident Reports, and Safety Related Condition Reports, as amended (49 C.F.R. 191); and Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards, as amended (49 C.F.R. 192)
Wyoming Department of Environmental Quality, Water Quality Division (WDEQ/WQD)	Permits to construct settling ponds and waste water systems, including ground water injection and disposal wells	Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (Wyoming Statute [W.S.] 35-11-301 through 35-11-311)
	Regulate disposal of drilling fluids from abandoned reserve pits	Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.W. 35-11-301 through 35-11-311)
	NPDES permits for discharging waste water and storm water runoff	WDEQ-WQD Rules and Regulations, Chapter 18; Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311); Section 405 of the Federal Water Pollution Control Act (Clean Water Act) (codified at 33 U.S.C. 1345); EPA-administered (40 C.F.R. 122); State Program Requirements (40 C.F.R. 123); EPA Water Program Procedures for Decision-making, as amended (40 C.F.R. 124)
	Administrative approval for discharge of hydrostatic test water	Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
Wyoming Department of Environmental Quality, Air Quality Division (WDEQ/ADQ)	Permits to construct and permits to operate	Clean Air Act, as amended (42 U.S.C. 7401 et seq.); Wyoming Environmental Quality Act, Article 2, Air Quality, as amended (W.S. 35-11-201 through 35-11-212)
Wyoming Department of Environmental Quality, Land Quality Division (WDEQ/LQD)	Mine permits, impoundments, and drill hole plugging on state lands	Wyoming Environmental Quality Act, Article 4, Land Quality, as amended (W.S. 35-11-401 through 35-11-437)
Wyoming Department of Environmental Quality, Solid Waste Division (WDEQ/SWD)	Construction fill permits and industrial waste facility permits for solid waste and disposal during construction and operations	Wyoming Environmental Quality Act, Article 5, Solid Waste Management, as amended (W.S. 35-11-501 through 35-11-520)
Wyoming Department of Transportation (WDOT)	Permits for oversize, overlength, and overweight loads	Chapters 17 and 20 of the Wyoming Highway Department Rules and Regulations

Agency	Permit, Approval, or Action	Authority
	Access permits to state highways	Chapter 13 of the Wyoming Highway Department Rules and Regulations
Wyoming Oil and Gas Conservation Commission (WOGCC)/Wyoming Board of Land Commissioners/Land and Farm Loan Office	Approval of oil and gas leases, ROWs for long-term or permanent off-lease/off-unit roads and pipelines, temporary use permits, and development on state lands	Public Utilities, W.S. 37-1-101 et seq.
	Permit to drill, deepen or plug back (APD process)	WOGCC Regulation, Chapter 3, Operational and Drilling Rules, Section 2 Location of Wells
	Permit to use earthen pit (reserve pit)	WOGCC Regulations, Chapter 4, Environmental Rules, Including Underground Injection Control Program Rules for Enhanced Recovery and Disposal Projects, Section 1, Pollution and Surface Damage (Forms 14A and 14B)
	Authorization for flaring or venting of gas	WOGCC Regulations, Chapter 3, Operational and Drilling Rules, Section 45 Authorization for Flaring or Venting of Gas
	Permit for Class II underground injection wells	Underground Injection Control Program: Criteria and Standards, as amended (40 C.F.R. 146); State Underground Injection Control Programs, State-administered program- Class II Wells, as amended (40 C.F.R. 147,2551)
	Well plugging and abandonment	WOGCC Regulations, Chapter 3, Section 14, Reporting (Form 4) Section 15, Plugging of Wells, Stratigraphic Toxic, Core, or Other Exploratory Holes (Form 4)
	Change in depletion plans	Wyoming Oil and Gas Act, as amended (W.S. 30-5-110)
Wyoming State Engineer's Office (WSEO)	Permits to appropriate ground water (use, storage, wells, dewatering)	W.S. 41-3-938, as amended (Form U.W. 5)
Wyoming State Historic Preservation Office (SHPO)	Cultural resource protection, programmatic agreements, consultation	Section 106 of National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et req.) and advisory Council Regulations on Protection of Historic and Cultural Properties, as amended (36 C.F.R. 800)

1.3 LAND AND RESOURCE MANAGEMENT ISSUES AND CONCERNS

In accordance with NEPA and CEQ regulations 40 CFR 1501.7, an early and open process for determining the scope of issues to be addressed is required and for identifying the significant issues related to a proposal. In compliance with this procedural requirement, the BLM, RSFO released a scoping notice on February 28, 2002 for a 30-day review period. Sixteen comment letters were received. The scoping process led to the identification of the following land and resource management issues and concerns potentially associated with the Proposed Action:

- Impacts to the Red Desert Watershed Management Area and the Great Divide Basin
- Impacts to Class III visual resources
- Impacts to cultural resources, Native American Religious Concerns, Indian Trail
- Impacts on Great Divide Basin Wild Horse Herd

- Impacts of noise
- Impacts on resources from road layout and transportation planning
- Impacts to Brannan homestead
- Impacts on wetlands/playa lakes
- Conformance with LUP/Leases
- Impacts of produced water injection on subsurface hydrology, and geology including subsidence
- Impacts to aquifer being produced including water quality and recharge of aquifers
- Impacts of surface discharge on soils, domestic water supply and surface water quality of streams and reservoirs
- Impacts to wildlife and water table if reservoirs are required to store produced water
- Reclamation of soils and vegetation if surface reservoirs are required to store produced water
- Potential for migration of methane
- Potential for underground (coal seam) fire
- Risk to ground water from hydraulic fracturing
- Impacts to soils due to construction of roads, well pads, and buried pipelines
- Control of invasive, non-native species (weeds).
- Protection of special status wildlife and plant species including endangered, threatened, candidate, proposed, and BLM sensitive species including bald eagle, Whooping Crane, Mountain plover, black-footed ferrets, and Ute-ladies' tresses
- Potential for depletion of Colorado and/or Platte River water
- Potential effects on small and big game species, and migratory birds
- Impacts to air quality
- Impacts to recreation, open spaces, visual resource values
- Impacts to social/economic values
- Application and acquisition of appropriate permits
- Reclamation
- Cumulative impacts
- Use of alternative technologies, particularly directional drilling
- Potential for impacts to biological soil crusts

Certain issues were determined to not be "significant issues related to the Proposed Action" (40 CFR 1501.7) because they are not potentially affected or impacted by the proposal. These issues brought forth during public scoping and reasons for eliminating that issue from consideration in the analysis are stated below.

Potential Impacts to the Brannan Homestead

This property is located more than four miles north, northwest of the project area, well outside the analysis area of the Proposed Action.

Underground Coal Fires

Spontaneous combustion of the seam following dewatering is not possible. The coal-bearing seam is "confined", meaning it does not outcrop (is not exposed at the surface), so sufficient oxygen is not available for spontaneous combustion.

Subsidence

Although it is possible for subsidence to occur, experience in the RSFO has shown subsidence is only likely to occur when material (i.e., coal, trona) is extracted. Extraction of coal is not proposed for this action and only partial dewatering of the coal seam is necessary for the gas to desorb. The coal seam is located well over 3,000 feet deep and the integrity of the formations above (i.e., sandstone) would preclude any subsidence from occurring at the surface. The pilot project affects only a small portion of the Big Red Coal further reducing any potential for subsidence to occur.

Migration of Methane

Migration of natural gas to the surface was identified during public scoping as a possible health hazard. The target zone of the proposal is the Big Red Coal, 3,600 to 6,700 feet below the surface. The targeted natural gas reservoir is confined, and fractures or other structures that would allow the gas to move from the formation are not present. The layered overburden includes sandstone, siltstones and over 600 feet of shale. Migration of gas to the surface is extremely unlikely. Large quantities of gas would need to migrate through more than 3,000 feet of layered rock to reach the surface, an extremely unlikely occurrence. Migration is further prohibited by well completion processes, designed and implemented to prevent the loss of the resource being produced. The area between the boreholes and casing will be cemented from surface to total depth, preventing the gas from migrating other than through the production pipe.

The efficiency of completion methods is demonstrated by existing wells in similar settings that do not allow migration of the gas. Many gas wells produce from intervals less than 4,500 feet deep in Wyoming, and in the Rocky Mountains. PI/Dwights oil and gas well production database lists over 500 shallow (less than 4,500 feet) gas wells in Wyoming and about 9,600 shallow gas wells for the entire Rocky Mountains (excluding coal bed gas wells). Many of the wells produce from gas reservoirs that are much shallower than the Big Red Coal in the project area.

Invalid CBM Leases

The Final Environmental Impact Statement (1996) for GRRMP recognized CBM development potential of up to 300 wells (pg 674, Appendix 12-1).

Potential Damage to Reservoirs, Streams and Wetlands through Surface Discharge of Produced Waters

Surface discharge of produced water is not being proposed nor considered as an alternative. The proponent is not requesting surface discharge in the proposal action. The quality of produced water found at such depths is expected to be too poor to allow any surface discharge. If injection of produced water can not be accomplished, the Proposed Action would be deemed a failure and would not proceed further.

Potential for Depletion of Colorado and/or Platte River Waters

The subsurface and surface water resources in the Great Divide Basin are hydrographically closed. The proposal has no potential to impact these resources.

Impacts to Domestic Water Supplies

The nearest domicile with a domestic water supply is more than 8 miles away. Aquifers accessed for domestic water supplies are far shallower (by hundreds of feet) than the target production zone for this proposal. Data from Powder River Basin water monitor wells have shown that when a sandstone aquifer is separated from a dewatered coal by more than 100 feet of siltstone and shale there is very little if any impact on the adjacent aquifer (Joe Meyer, BLM Hydrologist, personal communication with Fred Crockett, Petroleum Geologist, Wyoming State Office – Reservoir Management Group). More than 600 feet of shale with interbedded sandstone, siltstone, and thin coal beds overlie the Big Red Coal within the project area. Based on the available information in the Wyoming State Engineer's water well database, there are no water wells productive from the Big Red Coal zone within six miles of the project area and the deepest water well within six miles of the project area is 610 feet. There are no known springs in the project area indicated on U.S. Geological Survey topographic maps. Any springs that may exist issue from exposed beds and are more likely to produce from sandstone layers. Any exposed beds issuing ground water are separated by over 3,000 feet of rock strata from the Big Red Coal bed.

Potential for impacts to domestic water supplies from injection of the produced water is also minimal to non-existent. The target zone for the two injection wells is Fort Union formation sands. The Fort Union sands occur from 3,000 to 5,100 feet below the surface and are part of that confined basin previously described. These two wells will also be completed with best technology practices. The Fort Union formation is isolated above and below by competent shale barriers, as shown on well logs from the area. These shales will prevent the initiation and propagation of fractures through overlying strata to any fresh water zones. Regardless of this, the potential for injected water to reach the nearest domestic well, approximately 8 miles south of and up-dip from the project area is non-existent. In summary, it is extremely unlikely that depletion of water from the Big Red Coal would affect any water wells or springs.

Risk to Ground Water from Hydraulic Fracturing

Aquifers accessed for water supplies are nearer the surface than the target zone and are separated by hundreds of feet of sedimentary layers from the target zone. Hydraulic fracturing will be performed in accordance with best technological methods designed to protect against risks to other aquifers. The EPA recently released a draft report addressing potential for impacts to underground sources of drinking water by hydraulic fracturing of coal bed methane reservoirs (EPA 816-D-02-006). Based on information from data collected during the Phase I investigation, the EPA has preliminarily found that "the potential threats to public health posed by hydraulic fracturing of CBM wells appear to be small and do not appear to justify additional study." For more details on protective practices, refer to Chapter 2, this document, under Well Completion and Testing.

Potential for Impacts to Biological Soil Crusts

Biological soil crusts are common, but not ubiquitous, in semiarid and arid environments. Unlike the Colorado Plateau area, where crusts are a prominent feature, crusts in southwest Wyoming seem to be limited to protected or inaccessible areas that probably have not been disturbed by historical or

contemporary, heavy, sustained livestock grazing. Observations have found crusts under shrubs and in other protected venues in this region. No crusts were observed in the project area during field reviews; however, this does not preclude their presence.

The fact that these crusts may exist in the project area does not limit development or other surface disturbing activities. Since biologic crusts are integral to the topsoil, and in fact are part of the topsoil, they receive the same protection as topsoil, which is considered to be a valuable resource. The RSFO mandates a minimum of 6 inches of topsoil salvage prior to surface disturbing actions such as construction of well pads, roads, and pipelines. The salvaged topsoil is recontoured and seeded with native species, usually within 2 to 3 months of original disturbance, in order to maintain soil microbe viability and increase reclamation success.

It is unlikely that construction activities related to the Proposed Action will be located on contiguous areas of biological soil crusts. Should such an area be identified, efforts would be made to avoid these contiguous crusts, as would any area identified as having sensitive or fragile soils.